

ABSTRACT OF THE DISCLOSURE

A water insoluble interpenetrating polymer network is obtained by independently cross-linking a first polymer derived from a sulfonic acid or phosphonic acid group containing alkenyl monomer and a second polymer polymerized independently of the first polymer and interpenetrating the first polymer, where the second polymer is selectively permeable to water compared to methanol. Through adjustment of the degree of first polymer monomer acidification, polymer ratios and the extent of cross-linking in the at least two interpenetrating polymers, ion conductivity and solvent permeability are controlled. A film produced from such a water insoluble interpenetrating polymer network is well suited as a membrane in a direct methanol fuel cell. The relative degree and mechanism of cross-linking and interpenetrating the first polymer and second polymer are also adjustable parameters that impact on film properties.